IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

HERA WIRELESS S.A. and SISVEL UK LIMITED, Plaintiffs, v. AMAZON.COM, INC., Defendant.	**Civil Action No. _____** **JURY TRIAL DEMANDED**

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiffs Hera Wireless S.A. ("Hera Wireless") and Sisvel UK Limited (Sisvel UK") (collectively "Plaintiffs"), for their Complaint against Defendant Amazon.com, Inc., ("Amazon" or "Defendant"), allege the following:

NATURE OF THE ACTION

1. This is an action for patent infringement arising under the Patent Laws of the United States, 35 U.S.C. § 1 *et seq*.

THE PARTIES

2. Plaintiff is a corporation organized under the laws of Luxembourg with a place of business at 50Val Fleuri, L-1526, Luxembourg.

3. Sisvel UK is a limited liability company organized under the laws of the United Kingdom with a place of business at 1 Kingdom Street, London, United Kingdom, W2 6BD.

4. Upon information and belief, Amazon is a corporation organized and existing under the laws of the State of Delaware, with a place of business at 410 Terry Avenue North, Seattle, WA 98109, and can be served through its registered agent, Corporation Service Company, 2711 Centerville Road Suite 400, Wilmington, DE 19808. Upon information and belief, Amazon sells

and offers to sell products and services throughout the United States, including in this judicial district, and introduces products and services that into the stream of commerce and that incorporate infringing technology knowing that they would be sold in this judicial district and elsewhere in the United States.

JURISDICTION AND VENUE

5. This is an action for patent infringement arising under the Patent Laws of the United States, Title 35 of the United States Code.

6. This Court has subject matter jurisdiction under 28 U.S.C. §§ 1331 and 1338(a).

7. Venue is proper in this judicial district under 28 U.S.C. §1400(b). On information and belief, Amazon is incorporated in the State of Delaware.

8. On information and belief, Defendant is subject to this Court's general and specific personal jurisdiction because Defendant has sufficient minimum contacts within the State of Delaware and this District, pursuant to due process and/or the Del. Code. Ann. Tit. 3, § 3104, because Defendant purposefully availed itself of the privileges of conducting business in the State of Delaware and in this District, because Defendant regularly conducts and solicits business within the State of Delaware and within this District, and because Plaintiffs' causes of action arise directly from each of Defendant's business contacts and other activities in the State of Delaware and this District. Further, this Court has personal jurisdiction over Defendant because it is incorporated in Delaware and has purposely availed itself of the privileges and benefits of the laws of the State of Delaware.

BACKGROUND

9. This action involves three patents, described in detail in the counts below (collectively, the "Asserted Patents"), that claim Wi-Fi technologies developed in the early 2000s in Japan by Sanyo Electric Co., Ltd. ("Sanyo") scientists Yoshiharu Doi.

10. Panasonic Corporation ("Panasonic") subsequently purchased Sanyo in stages, with the final 20% being purchased on December 21, 2010. Sanyo thus became a wholly owned subsidiary of Panasonic.

11. At the time of the acquisition, both Sanyo and Panasonic were operating entities that offered products in the fields of consumer electronics and business applications. Indeed, both companies are household names.

12. Sanyo was actively involved with standards-development organizations that developed industry standards relevant to the company's product portfolio, including the company's Wi-Fi enabled consumer electronic goods.

13. The Institute of Electrical and Electronics Engineers (IEEE) is a leading standards-development organization for the development of industrial standards (having developed over 900 active industry technical standards) in a broad range of disciplines, including electric power and energy, telecommunications, consumer electronics, biomedical technology and healthcare-information technology, information assurance, transportation, aerospace, and nanotechnology.

14. Today, IEEE is the world's largest association of technical professionals with more than 420,000 members in over 160 countries around the world. Its objectives are the educational and technical advancement of electrical and electronic engineering, telecommunications, computer engineering, and allied disciplines.

15. The IEEE 802.11 standards, created by the IEEE, are a set of media access control (MAC) and physical layer (PHY) specifications for implementing wireless local area network (WLAN) computer communication in the 900 MHz and 2.4, 3.6, 5, and 60 GHz frequency bands.

16. The IEEE 802.11 standards are created and maintained by the IEEE LAN/MAN Standards Committee (IEEE 802).

17. The base version of IEEE 802.11 was released in 1997, and has had subsequent amendments. The standard and amendments provide the basis for wireless network products using the Wi-Fi brand.

18. The inventions claimed in the Asserted Patents relate to radio apparatuses configured to perform improved multiple-input multiple-output ("MIMO") wireless local area network communications, and the claimed technologies have become industry standard for Wi-Fi products. Radio apparatuses certified as compliant with IEEE Standard 802.11n-2009 necessarily meet the claim limitations of the Asserted Patents. Inventors Yoshiharu Doi participated in the standards-setting organization leading to the development and adoption of the 802.11n-2009 standard.

19. IEEE 802.11n-2009, commonly shortened to 802.11n, is a wireless-networking standard that uses multiple antennas to increase data rates. It is an amendment to the IEEE 802.11-2007 wireless-networking standard, and its purpose is to improve network throughput over the two previous standards —802.11a and 802.11g —with a significant increase in the maximum net data rate from 54 Mbit/s to 600 Mbit/s (slightly higher gross bit rate, including, for example, error-correction codes, and slightly lower maximum throughput) with the use of four spatial streams at a channel width of 40 MHz.

20. The standard has enabled increased efficiency, as evidenced by the fact that MIMO is now found in most high-end, Wi-Fi-enabled consumer electronics. The majority of products adopting this technological advance are advertised as being compliant with the

standard, and companies regularly list their product as compliant with this particular standard on trade group web sites (such as the Wi-Fi Alliance website).

21. In March 2011, Plaintiff Hera Wireless obtained licensing rights to the Asserted Patents.

22. In September 2012, Plaintiff Hera Wireless partnered with Plaintiff Sisvel UK, part of the Sisvel Group ("Sisvel"), to license the Asserted Patents on an exclusive basis industry wide. Sisvel has since been licensing the Asserted Patents on behalf of Hera Wireless across Europe and Asia, with companies taking a license based on the value of the patents without need for litigation.

23. In June 2014, Hera Wireless acquired the Asserted Patents and others from Sanyo via a Patent Assignment Agreement.

24. In early 2016, Sisvel initiated licensing activities in North America via its U.S. subsidiary, Sisvel US Inc.

25. Founded in Italy in 1982, Sisvel is a world leader in fostering innovation and managing intellectual property. Sisvel works with its partners offering a comprehensive approach to patent licensing: from issuing initial calls for essential patents; facilitating discussions among stakeholders; developing multiparty license agreements; executing and administering licenses; to collecting and distributing royalties. At the same time, Sisvel actively promotes a culture of respect and understanding of the intellectual property and innovation ecosystem through, for example, its regular presence at the key consumer electronics trade fairs and intellectual property events, participation in policy discussions and conferences, as well as open dialogues with a number of government bodies, standard-setting organizations and industry associations.

26. As of the date this complaint was filed, over sixty companies have licensed one or more of the industry-standard Asserted Patents, along with other Sisvel patents related to Wi-Fi technology.

COUNT I – INFRINGEMENT OF U.S. PATENT NO. 7,962,103

27. The allegations set forth in the foregoing paragraphs 1 through 26 are incorporated into this First Claim for Relief.

28. On June 14, 2011, U.S. Patent No. 7,962,103 ("the '103 patent"), entitled "Radio Apparatus, and Method and Program for Controlling Spatial Path," was duly and legally issued by the United States Patent and Trademark Office. A true and correct copy of the '103 patent is attached as Exhibit 1.

29. Plaintiff Hera Wireless is the assignee and owner of the right, title and interest in and to the '103 patent. Plaintiffs have the right to assert all causes of action arising under said patent and the right to any remedies for infringement thereof.

30. Upon information and belief, Defendant has and continues to directly infringe at least claims 1 and 4 of the '103 patent by making, using, selling, importing and/or providing and causing to be used products incorporating radio transmitting apparatuses compliant with IEEE Standard 802.11n-2009 (the "Accused Instrumentalities"). For example, Defendant affirmatively represents at the following URL that it makes and sells products compliant with IEEE Standard 802.11n-2009: https://www.amazon.com/Amazon-Echo-Bluetooth-Speaker-with-WiFi-Alexa/dp/B00X4WHP5E. However, the Accused Instrumentalities are understood to include any and all products that Defendant has or continues to make, use, sell, import and/or provide and cause to be used that are compliant with IEEE Standard 802.11n-2009.

31. In particular, claim 1 of the '103 patent recites a radio apparatus capable of communicating with another radio apparatus by forming a plurality of spatial paths

therebetween, the radio apparatus comprising: an adaptive array unit capable of performing adaptive array processing on signals corresponding to a plurality of antennas, respectively; a storage unit which stores beforehand a value indicating possible multiplicity associated with the number of spatial paths formable by said adaptive array unit; and a control unit which controls a processing of transmitting the value indicating possible multiplicity to the another radio apparatus at a predetermined timing.

32. On information and belief, the Accused Instrumentalities infringe claim 1 of the ’103 patent because they comply with IEEE Standard 802.11n-2009, which requires a radio apparatus capable of communicating with another radio apparatus by forming a plurality of spatial paths therebetween (the block diagram below illustrates exemplary elements of the Accused Instrumentalities that function to generate a plurality of spatial paths according to the standard):

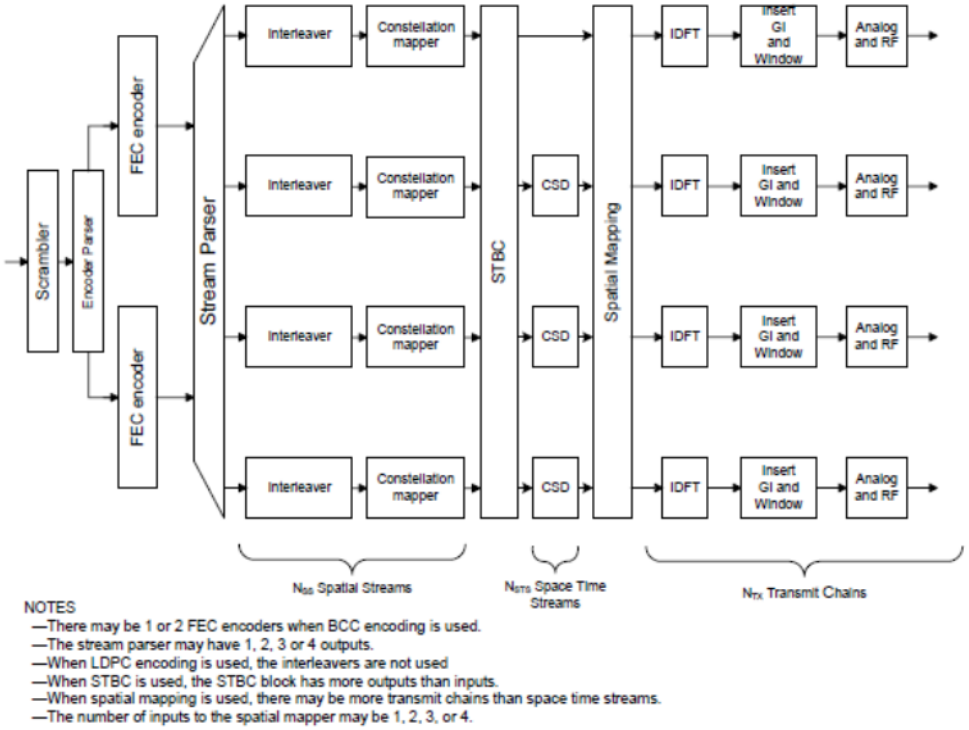

Figure 20-3—Transmitter block diagram 2

the radio apparatus comprising: an adaptive array unit capable of performing adaptive array processing on signals corresponding to the plurality of antennas, respectively:

> The adaptive array unit comprises a transmitter with the following functionality:
>
> **IEEE Std. 802.11n-2009**
>
> **20.3.11.10.1 Spatial mapping**
>
> The transmitter may choose to rotate and/or scale the constellation mapper output vector (or the space-time block coder output, if applicable). This rotation and/or scaling is useful in the following cases:
>
> — When there are more transmit chains than space-time streams,
>
> — As part of (an optional) sounding packet
>
> — As part of (an optional) calibration procedure
>
> — When the packet is transmitted using one of the (optional) beamforming techniques

a storage unit which stores beforehand a value indicating possible multiplicity associated with the number of spatial paths formable by said adaptive array unit:

IEEE Std. 802.11n-2009

7.3.2.56.4 Supported MCS Set field

The Supported MCS Set field of the HT Capabilities element indicates which MCSs a STA supports.

An MCS is identified by an MCS index, which is represented by an integer in the range 0 to 76. The interpretation of the MCS index (i.e., the mapping from MCS to data rate) is PHY dependent. For the HT PHY, see 20.6.

The structure of the MCS Set field is defined in Figure 7-95o20.

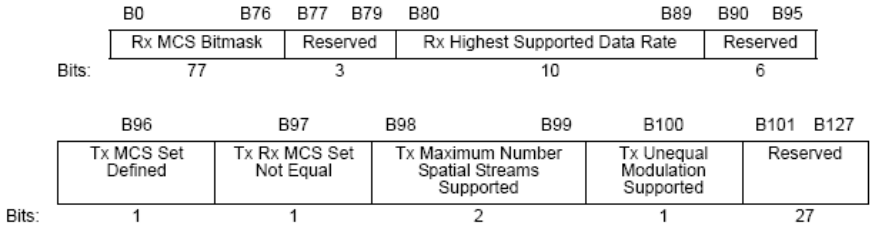

Figure 7-95o20—Supported MCS Set field

Section 20.6 defines the RX MCS Bitmask, and in particular Table 20.29 to Table 20.43 connect each index to a maximum number of spatial streams (Nss). For example:

The rate-dependent parameters for optional 20 MHz, N_{SS} = 3 MCSs with N_{ES} = 1 and EQM of the spatial streams shall be as shown in Table 20-31.

Table 20-31—MCS parameters for optional 20 MHz, N_{SS} = 3, N_{ES} = 1, EQM

MCS Index	Modulation	R	$N_{BPSCS(iSS)}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)	
								800 ns GI	400 ns GI
16	BPSK	1/2	1	52	4	156	78	19.5	21.7
17	QPSK	1/2	2	52	4	312	156	39.0	43.3
18	QPSK	3/4	2	52	4	312	234	58.5	65.0
19	16-QAM	1/2	4	52	4	624	312	78.0	86.7
20	16-QAM	3/4	4	52	4	624	468	117.0	130.0
21	64-QAM	2/3	6	52	4	936	624	156.0	173.3
22	64-QAM	3/4	6	52	4	936	702	175.5	195.0
23	64-QAM	5/6	6	52	4	936	780	195.0	216.7

and a control unit which controls a processing of transmitting the value indicating possible multiplicity to the another radio apparatus at a predetermined timing:

> As shown above, the MCS Set field, including the Rx MCS set, is part of the HT Capabilities element. The HT Capabilities element, including the Rx MCS set, is transmitted to another radio apparatus, as set forth below:
>
> **7.3.2.56.1 HT Capabilities element structure**
>
> An HT STA declares that it is an HT STA by transmitting the HT Capabilities element. The HT Capabilities element contains a number of fields that are used to advertise optional HT capabilities of an HT STA. The HT Capabilities element is present in Beacon, Association Request, Association Response, Reassociation Request, Reassociation Response, Probe Request, and Probe Response frames. The HT Capabilities element is defined in Figure 7-95o17.
>
> The standard prescribes that the Beacon is transmitted at a predetermined timing, as set forth below:
>
> **11.1.1.1 TSF for infrastructure networks**
>
> In an infrastructure BSS, the AP shall be the timing master for the TSF. The AP shall initialize its TSF timer independently of any simultaneously started APs in an effort to minimize the synchronization of the TSF timers of multiple APs. The AP shall periodically transmit special frames called *Beacon frames* that contain a copy of its TSF timer to synchronize the TSF timers of other STAs in a BSS. A receiving STA shall always accept the timing information in Beacon frames sent from the AP servicing its BSS. If a STA's TSF timer is different from the timestamp in the received Beacon frame, the receiving STA shall set its local TSF timer to the received timestamp value.
>
> Beacon frames shall be generated for transmission by the AP once every dot11BeaconPeriod TUs.
>
> **11.1.2 Maintaining synchronization**
>
> Each STA shall maintain a TSF timer with modulus 2^{64} counting in increments of microseconds. STAs expect to receive Beacon frames at a nominal rate. The interval between Beacon frames is defined by the dot11BeaconPeriod parameter of the STA. A STA sending a Beacon frame shall set the value of the Beacon frame's timestamp so that it equals the value of the STA's TSF timer at the time that the data symbol containing the first bit of the timestamp is transmitted to the PHY plus the transmitting STA's delays through its local PHY from the MAC-PHY interface to its interface with the WM [e.g., antenna, light-emitting diode (LED) emission surface].

33. Claim 4 of the '103 patent recites a radio apparatus capable of communicating with another radio apparatus by forming a plurality of spatial paths therebetween, the radio apparatus comprising: a plurality of antennas constituting an array antenna; an adaptive array unit capable of performing adaptive array processing on signals corresponding to the plurality of

antennas, respectively; a storage unit which stores beforehand a value indicating possible multiplicity associated with the number of spatial paths formable by said adaptive array unit; and a control unit which controls a processing of transmitting the value indicating possible multiplicity to the another radio apparatus at a predetermined timing.

34. On information and belief, the Accused Instrumentalities infringe claim 4 of the ’103 patent because they comply with IEEE Standard 802.11n-2009, which requires a radio apparatus capable of communicating with another radio apparatus by forming a plurality of spatial paths therebetween (the block diagram below illustrates exemplary elements of the Accused Instrumentalities that function to generate a plurality of spatial paths according to the standard):

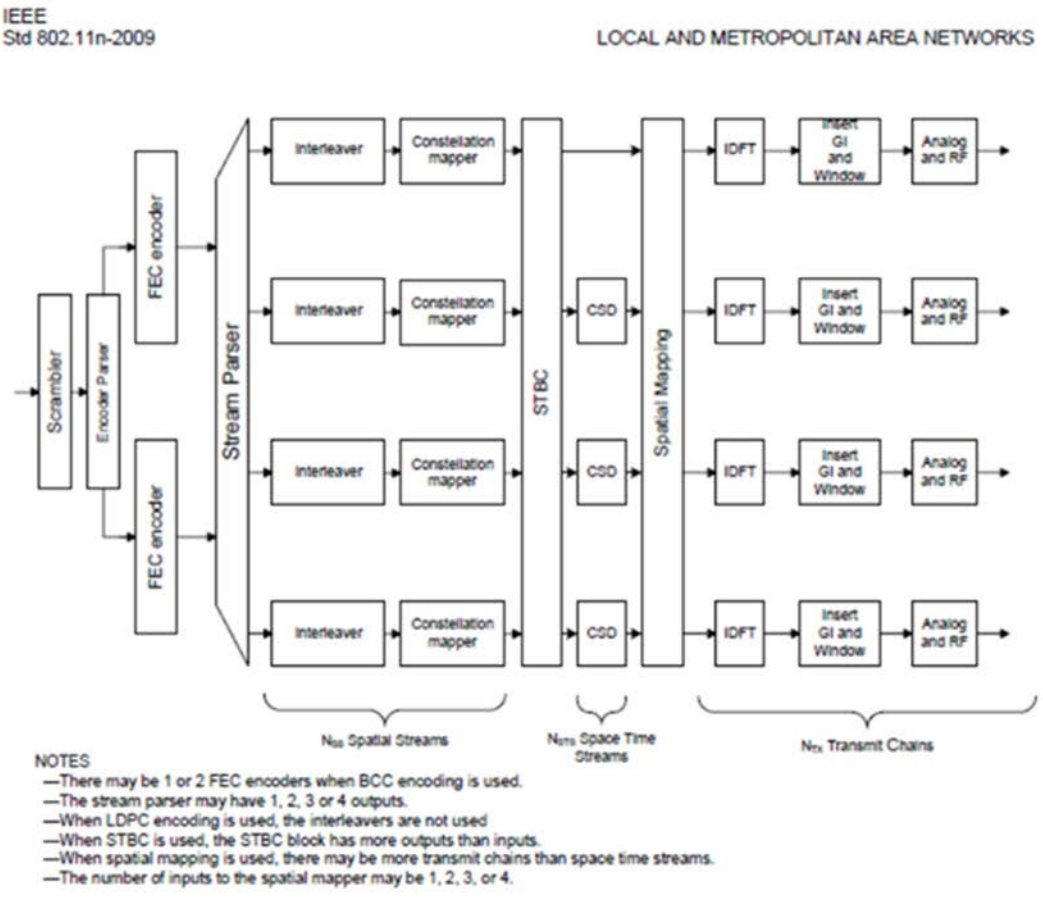

Figure 20-3—Transmitter block diagram 2

the radio apparatus comprising: a plurality of antennas constituting an array antenna:

> **IEEE Std. 802.11n-2009**
>
> **20.3.9 HT preamble**
>
> **20.3.9.1 Introduction**
>
> The HT preambles are defined in HT-mixed format and in HT-greenfield format to carry the required information to operate in a system with multiple transmit and multiple receive antennas.
>
> *See also*:
>
> 3.249 spatial stream: One of several streams of bits or modulation symbols that may be transmitted over multiple spatial dimensions that are created by the use of multiple antennas at both ends of a communications link.

an adaptive array unit capable of performing adaptive array processing on signals corresponding to the plurality of antennas, respectively:

> The adaptive array unit comprises a transmitter with the following functionality:
>
> **IEEE Std. 802.11n-2009**
>
> **20.3.11.10.1 Spatial mapping**
>
> The transmitter may choose to rotate and/or scale the constellation mapper output vector (or the space-time block coder output, if applicable). This rotation and/or scaling is useful in the following cases:
>
> — When there are more transmit chains than space-time streams,
>
> — As part of (an optional) sounding packet
>
> — As part of (an optional) calibration procedure
>
> — When the packet is transmitted using one of the (optional) beamforming techniques

a storage unit which stores beforehand a value indicating possible multiplicity associated with the number of spatial paths formable by said adaptive array unit:

> **IEEE Std. 802.11n-2009**
>
> **7.3.2.56.4 Supported MCS Set field**

The Supported MCS Set field of the HT Capabilities element indicates which MCSs a STA supports.

An MCS is identified by an MCS index, which is represented by an integer in the range 0 to 76. The interpretation of the MCS index (i.e., the mapping from MCS to data rate) is PHY dependent. For the HT PHY, see 20.6.

The structure of the MCS Set field is defined in Figure 7-95o20.

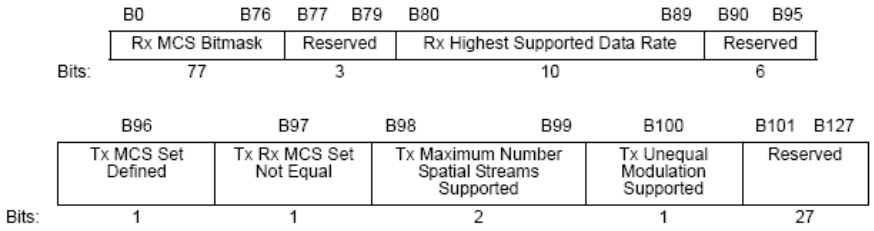

Figure 7-95o20—Supported MCS Set field

Section 20.6 defines the RX MCS Bitmask, and in particular Table 20.29 to Table 20.43 connect each index to a maximum number of spatial streams (Nss). For example:

The rate-dependent parameters for optional 20 MHz, N_{SS} = 3 MCSs with N_{ES} = 1 and EQM of the spatial streams shall be as shown in Table 20-31.

Table 20-31—MCS parameters for optional 20 MHz, N_{SS} = 3, N_{ES} = 1, EQM

MCS Index	Modulation	R	$N_{BPSCS(iSS)}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)	
								800 ns GI	400 ns GI
16	BPSK	1/2	1	52	4	156	78	19.5	21.7
17	QPSK	1/2	2	52	4	312	156	39.0	43.3
18	QPSK	3/4	2	52	4	312	234	58.5	65.0
19	16-QAM	1/2	4	52	4	624	312	78.0	86.7
20	16-QAM	3/4	4	52	4	624	468	117.0	130.0
21	64-QAM	2/3	6	52	4	936	624	156.0	173.3
22	64-QAM	3/4	6	52	4	936	702	175.5	195.0
23	64-QAM	5/6	6	52	4	936	780	195.0	216.7

and a control unit which controls a processing of transmitting the value indicating possible multiplicity to the another radio apparatus at a predetermined timing:

As shown above, the MCS Set field, including the Rx MCS set, is part of the HT Capabilities element. The HT Capabilities element, including the Rx MCS set, is transmitted to another radio apparatus, as set forth below:

7.3.2.56.1 HT Capabilities element structure

> An HT STA declares that it is an HT STA by transmitting the HT Capabilities element. The HT Capabilities element contains a number of fields that are used to advertise optional HT capabilities of an HT STA. The HT Capabilities element is present in Beacon, Association Request, Association Response, Reassociation Request, Reassociation Response, Probe Request, and Probe Response frames. The HT Capabilities element is defined in Figure 7-95o17.

The standard prescribes that the Beacon is transmitted at a predetermined timing, as set forth below:

> **11.1.1.1 TSF for infrastructure networks**
>
> In an infrastructure BSS, the AP shall be the timing master for the TSF. The AP shall initialize its TSF timer independently of any simultaneously started APs in an effort to minimize the synchronization of the TSF timers of multiple APs. The AP shall periodically transmit special frames called *Beacon frames* that contain a copy of its TSF timer to synchronize the TSF timers of other STAs in a BSS. A receiving STA shall always accept the timing information in Beacon frames sent from the AP servicing its BSS. If a STA's TSF timer is different from the timestamp in the received Beacon frame, the receiving STA shall set its local TSF timer to the received timestamp value.
>
> Beacon frames shall be generated for transmission by the AP once every dot11BeaconPeriod TUs.
>
> **11.1.2 Maintaining synchronization**
>
> Each STA shall maintain a TSF timer with modulus 2^{64} counting in increments of microseconds. STAs expect to receive Beacon frames at a nominal rate. The interval between Beacon frames is defined by the dot11BeaconPeriod parameter of the STA. A STA sending a Beacon frame shall set the value of the Beacon frame's timestamp so that it equals the value of the STA's TSF timer at the time that the data symbol containing the first bit of the timestamp is transmitted to the PHY plus the transmitting STA's delays through its local PHY from the MAC-PHY interface to its interface with the WM [e.g., antenna, light-emitting diode (LED) emission surface].

35. On information and belief, these Accused Instrumentalities are used, marketed, provided to, and/or used by or for each of Defendant's partners, clients, customers and end users across the country and in this District.

36. Defendant was made aware of the '103 patent and its infringement thereof at least as early as April 14, 2016, when Chuck Hausmann, Esq., on behalf of Plaintiffs, sent a letter to Mr. David Zaplosky, General Counsel for Defendant, disclosing the '103 patent and other of Plaintiffs' patents and alleging that Defendant's products infringed the '103 patent, among others.

37. Upon information and belief, since at least the time Defendant received notice, Defendant has induced and continues to induce others to infringe at least one claim of the ’103 patent under 35 U.S.C. § 271(b) by, among other things, and with specific intent or willful blindness, actively aiding and abetting others to infringe, including but not limited to Defendant’s partners, clients, customers, and end users, whose use of the Accused Instrumentalities constitutes direct infringement of at least one claim of the ’103 patent.

38. In particular, Defendant’s actions that aid and abet others such as its partners, customers, clients, and end users to infringe include advertising and distributing the Accused Instrumentalities and providing instruction materials, training, and services regarding the Accused Instrumentalities. On information and belief, Defendant has engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement because Defendant has had actual knowledge of the ’103 patent and knowledge that its acts were inducing infringement of the ’103 patent since at least the date April 14, 2016 received notice that such activities infringed the ’103 patent.

39. Upon information and belief, Defendant is liable as a contributory infringer of the ’103 patent under 35 U.S.C. § 271(c) by offering to sell, selling and importing into the United States computerized trading platforms to be especially made or adapted for use in an infringement of the ’103 patent. The Accused Instrumentalities are a material component for use in practicing the ’103 patent and are specifically made and are not a staple article of commerce suitable for substantial non-infringing use.

40. Since April 14, 2016, Defendant’s infringement has been willful.

41. Plaintiffs have been harmed by Defendant’s infringing activities.

COUNT II – INFRINGEMENT OF U.S. PATENT NO. 8,412,115

42. The allegations set forth in the foregoing paragraphs 1 through 41 are incorporated into this Second Claim for Relief.

43. On April 2, 2013, U.S. Patent No. 8,412,115 ("the '115 patent"), entitled "Radio Apparatus, and Method and Program for Controlling Spatial Path," was duly and legally issued by the United States Patent and Trademark Office. A true and correct copy of the '115 patent is attached as Exhibit 2.

44. Plaintiff Hera Wireless is the assignee and owner of the right, title and interest in and to the '115 patent. Plaintiffs have the right to assert all causes of action arising under said patents and the right to any remedies for infringement thereof.

45. Upon information and belief, Defendant has and continues to directly infringe at least claims 1 and 4 of the '115 patent by making, using, selling, importing and/or providing and causing to be used the Accused Instrumentalities, as defined above.

46. In particular, claim 1 of the '115 patent recites a radio apparatus capable of communicating with another radio apparatus by forming a plurality of spatial paths therebetween, the radio apparatus comprising: a communication unit configured to communicate using an antenna; a storage unit which stores beforehand a value indicating possible multiplicity associated with the number of spatial paths formable by said communication unit; and a control unit which controls a processing of transmitting the value indicating possible multiplicity to the another radio apparatus at a predetermined timing.

47. On information and belief, the Accused Instrumentalities infringe claim 1 of the '115 patent because they comply with IEEE Standard 802.11n-2009, which requires a radio apparatus capable of communicating with another radio apparatus (the block diagram below

illustrates exemplary elements of the Accused Instrumentalities that function to generate a plurality of spatial paths according to the standard):

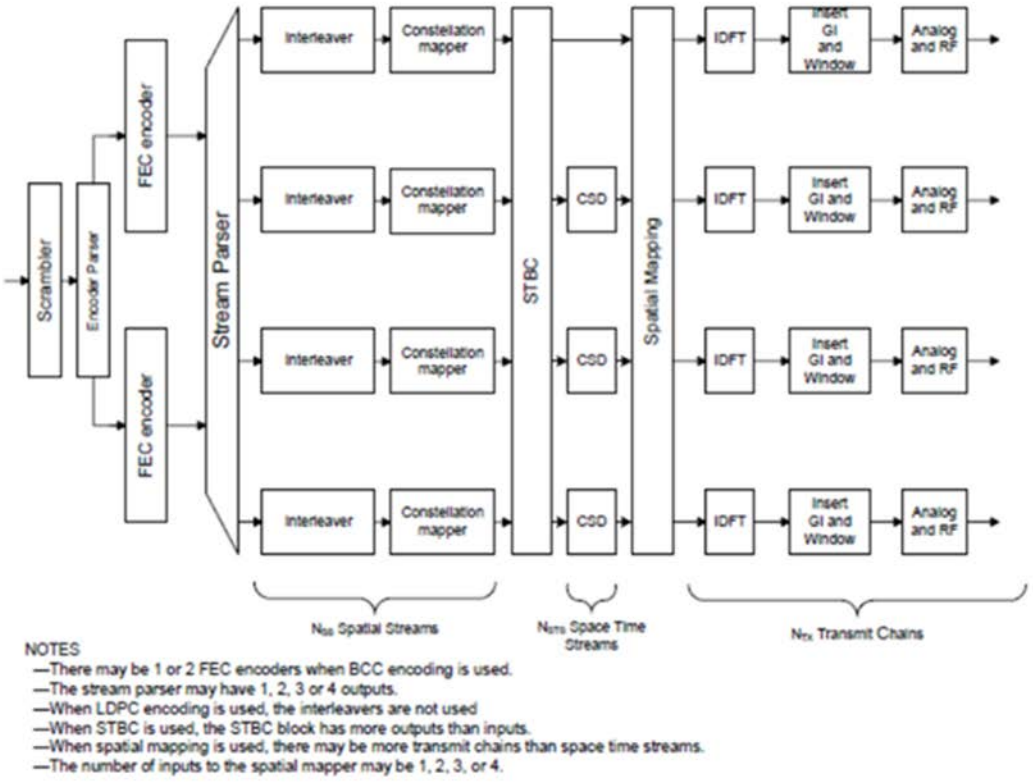

Figure 20-3—Transmitter block diagram 2

the radio apparatus comprising: a communication unit configured to communicate using an antenna:

> **IEEE Std. 802.11n-2009**
>
> **20.3.9 HT preamble**
>
> **20.3.9.1 Introduction**
>
> The HT preambles are defined in HT-mixed format and in HT-greenfield format to carry the required information to operate in a system with multiple transmit and multiple receive antennas.
>
> *See also*:

> **3.249 spatial stream:** One of several streams of bits or modulation symbols that may be transmitted over multiple spatial dimensions that are created by the use of multiple antennas at both ends of a communications link.

a storage unit which stores beforehand a value indicating possible multiplicity associated with the number of spatial paths formable by said communication unit:

> **IEEE Std. 802.11n-2009**
>
> **7.3.2.56.4 Supported MCS Set field**
>
> The Supported MCS Set field of the HT Capabilities element indicates which MCSs a STA supports.
>
> An MCS is identified by an MCS index, which is represented by an integer in the range 0 to 76. The interpretation of the MCS index (i.e., the mapping from MCS to data rate) is PHY dependent. For the HT PHY, see 20.6.
>
> The structure of the MCS Set field is defined in Figure 7-95o20.

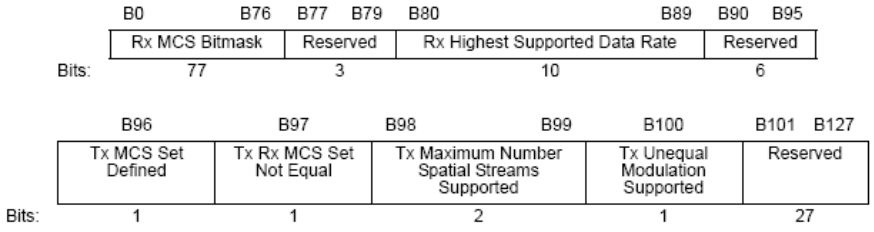

Figure 7-95o20—Supported MCS Set field

> Section 20.6 defines the RX MCS Bitmask, and in particular Table 20.29 to Table 20.43 connect each index to a maximum number of spatial streams (Nss). For example:

The rate-dependent parameters for optional 20 MHz, N_{SS} = 3 MCSs with N_{ES} = 1 and EQM of the spatial streams shall be as shown in Table 20-31.

Table 20-31—MCS parameters for optional 20 MHz, N_{SS} = 3, N_{ES} = 1, EQM

MCS Index	Modulation	R	$N_{BPSCS(iSS)}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)	
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17	QPSK	1/2	2	52	4	312	156	39.0	43.3
18	QPSK	3/4	2	52	4	312	234	58.5	65.0
19	16-QAM	1/2	4	52	4	624	312	78.0	86.7
20	16-QAM	3/4	4	52	4	624	468	117.0	130.0
21	64-QAM	2/3	6	52	4	936	624	156.0	173.3
22	64-QAM	3/4	6	52	4	936	702	175.5	195.0
23	64-QAM	5/6	6	52	4	936	780	195.0	216.7

and a control unit which controls a processing of transmitting the value indicating possible multiplicity to the another radio apparatus at a predetermined timing:

> As shown above, the MCS Set field, including the Rx MCS set, is part of the HT Capabilities element. The HT Capabilities element, including the Rx MCS set, is transmitted to another radio apparatus, as set forth below:
>
> **7.3.2.56.1 HT Capabilities element structure**
>
> An HT STA declares that it is an HT STA by transmitting the HT Capabilities element. The HT Capabilities element contains a number of fields that are used to advertise optional HT capabilities of an HT STA. The HT Capabilities element is present in Beacon, Association Request, Association Response, Reassociation Request, Reassociation Response, Probe Request, and Probe Response frames. The HT Capabilities element is defined in Figure 7-95o17.

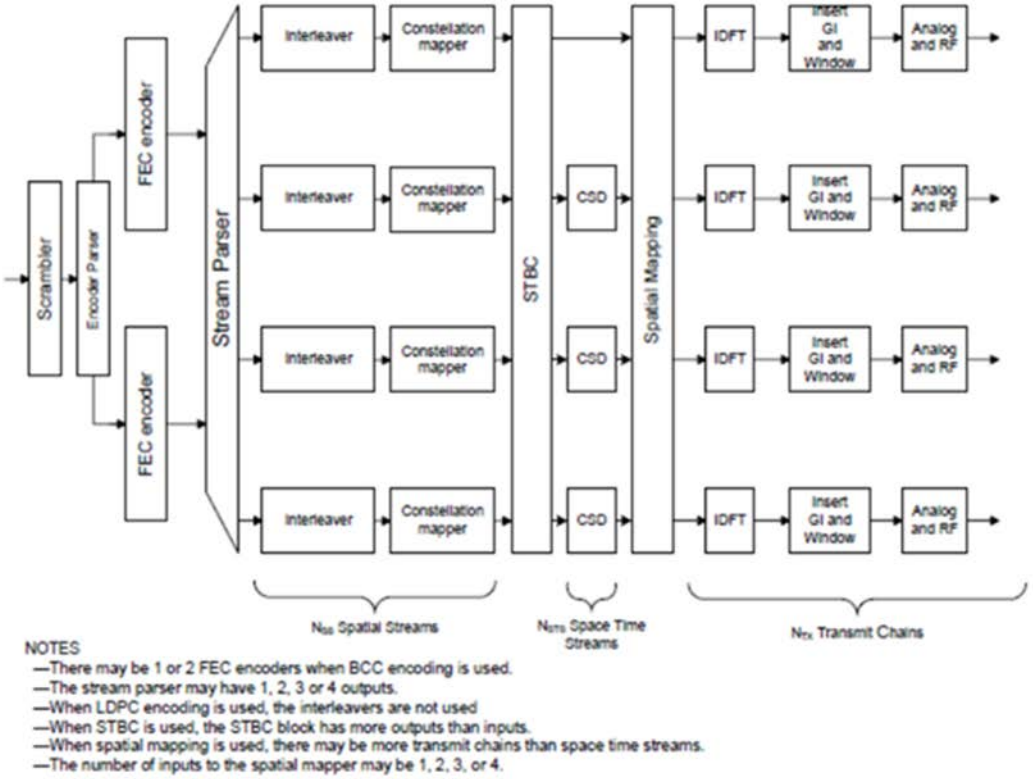
> The standard prescribes that the Beacon is transmitted at a predetermined timing, as set forth below:
>
> **11.1.1.1 TSF for infrastructure networks**
>
> In an infrastructure BSS, the AP shall be the timing master for the TSF. The AP shall initialize its TSF timer independently of any simultaneously started APs in an effort to minimize the synchronization of the TSF timers of multiple APs. The AP shall periodically transmit special frames called *Beacon frames* that contain a copy of its TSF timer to synchronize the TSF timers of other STAs in a BSS. A receiving STA shall always accept the timing information in Beacon frames sent from the AP servicing its BSS. If a STA's TSF timer is different from the timestamp in the received Beacon frame, the receiving STA shall set its local TSF timer to the received timestamp value.
>
> Beacon frames shall be generated for transmission by the AP once every dot11BeaconPeriod TUs.

11.1.2 Maintaining synchronization

Each STA shall maintain a TSF timer with modulus 2^{64} counting in increments of microseconds. STAs expect to receive Beacon frames at a nominal rate. The interval between Beacon frames is defined by the dot11BeaconPeriod parameter of the STA. A STA sending a Beacon frame shall set the value of the Beacon frame's timestamp so that it equals the value of the STA's TSF timer at the time that the data symbol containing the first bit of the timestamp is transmitted to the PHY plus the transmitting STA's delays through its local PHY from the MAC-PHY interface to its interface with the WM [e.g., antenna, light-emitting diode (LED) emission surface].

48. Claim 4 of the '115 patent recites a radio apparatus capable of communicating with another radio apparatus, the radio apparatus comprising: an antenna; a communication unit configured to communicate using an antenna; a storage unit which stores beforehand a value indicating possible multiplicity associated with the number of spatial paths formable by said communication unit; and a control unit which controls a processing of transmitting the value indicating possible multiplicity to the another radio apparatus at a predetermined timing.

49. On information and belief, the Accused Instrumentalities infringe claim 4 of the '115 patent because they comply with IEEE Standard 802.11n-2009, which requires a radio apparatus capable of communicating with another radio apparatus (the block diagram below illustrates exemplary elements of the Accused Instrumentalities that function to generate a plurality of spatial paths according to the standard):



NOTES
—There may be 1 or 2 FEC encoders when BCC encoding is used.
—The stream parser may have 1, 2, 3 or 4 outputs.
—When LDPC encoding is used, the interleavers are not used
—When STBC is used, the STBC block has more outputs than inputs.
—When spatial mapping is used, there may be more transmit chains than space time streams.
—The number of inputs to the spatial mapper may be 1, 2, 3, or 4.

Figure 20-3—Transmitter block diagram 2

the radio apparatus comprising: an antenna; a communication unit configured to communicate using an antenna:

IEEE Std. 802.11n-2009

20.3.9 HT preamble

20.3.9.1 Introduction

The HT preambles are defined in HT-mixed format and in HT-greenfield format to carry the required information to operate in a system with multiple transmit and multiple receive antennas.

See also:

3.249 spatial stream: One of several streams of bits or modulation symbols that may be transmitted over multiple spatial dimensions that are created by the use of multiple antennas at both ends of a communications link.

a storage unit which stores beforehand a value indicating possible multiplicity associated with the number of spatial paths formable by said adaptive array unit:

IEEE Std. 802.11n-2009

7.3.2.56.4 Supported MCS Set field

The Supported MCS Set field of the HT Capabilities element indicates which MCSs a STA supports.

An MCS is identified by an MCS index, which is represented by an integer in the range 0 to 76. The interpretation of the MCS index (i.e., the mapping from MCS to data rate) is PHY dependent. For the HT PHY, see 20.6.

The structure of the MCS Set field is defined in Figure 7-95o20.

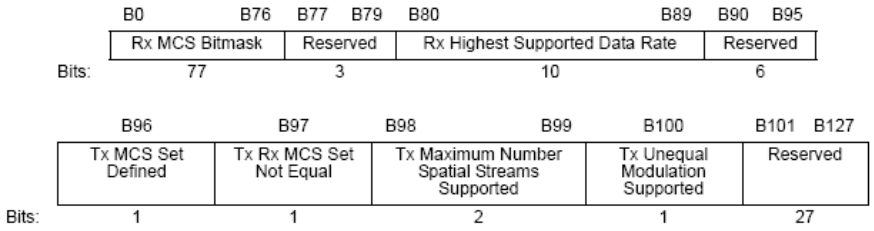


Figure 7-95o20—Supported MCS Set field

Section 20.6 defines the RX MCS Bitmask, and in particular Table 20.29 to Table 20.43 connect each index to a maximum number of spatial streams (Nss). For example:

The rate-dependent parameters for optional 20 MHz, N_{SS} = 3 MCSs with N_{ES} = 1 and EQM of the spatial streams shall be as shown in Table 20-31.

Table 20-31—MCS parameters for optional 20 MHz, N_{SS} = 3, N_{ES} = 1, EQM

MCS Index	Modulation	R	$N_{BPSCS(iSS)}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)	
								800 ns GI	400 ns GI
16	BPSK	1/2	1	52	4	156	78	19.5	21.7
17	QPSK	1/2	2	52	4	312	156	39.0	43.3
18	QPSK	3/4	2	52	4	312	234	58.5	65.0
19	16-QAM	1/2	4	52	4	624	312	78.0	86.7
20	16-QAM	3/4	4	52	4	624	468	117.0	130.0
21	64-QAM	2/3	6	52	4	936	624	156.0	173.3
22	64-QAM	3/4	6	52	4	936	702	175.5	195.0
23	64-QAM	5/6	6	52	4	936	780	195.0	216.7

and a control unit which controls a processing of transmitting the value indicating possible multiplicity to the another radio apparatus at a predetermined timing:

As shown above, the MCS Set field, including the Rx MCS set, is part of the HT Capabilities element. The HT Capabilities element, including the Rx MCS set, is transmitted to another radio apparatus, as set forth below:

7.3.2.56.1 HT Capabilities element structure

An HT STA declares that it is an HT STA by transmitting the HT Capabilities element. The HT Capabilities element contains a number of fields that are used to advertise optional HT capabilities of an HT STA. The HT Capabilities element is present in Beacon, Association Request, Association Response, Reassociation Request, Reassociation Response, Probe Request, and Probe Response frames. The HT Capabilities element is defined in Figure 7-95o17.

The standard prescribes that the Beacon is transmitted at a predetermined timing, as set forth below:

11.1.1.1 TSF for infrastructure networks

In an infrastructure BSS, the AP shall be the timing master for the TSF. The AP shall initialize its TSF timer independently of any simultaneously started APs in an effort to minimize the synchronization of the TSF timers of multiple APs. The AP shall periodically transmit special frames called *Beacon frames* that contain a copy of its TSF timer to synchronize the TSF timers of other STAs in a BSS. A receiving STA shall always accept the timing information in Beacon frames sent from the AP servicing its BSS. If a STA's TSF timer is different from the timestamp in the received Beacon frame, the receiving STA shall set its local TSF timer to the received timestamp value.

Beacon frames shall be generated for transmission by the AP once every dot11BeaconPeriod TUs.

11.1.2 Maintaining synchronization

Each STA shall maintain a TSF timer with modulus 2^{64} counting in increments of microseconds. STAs expect to receive Beacon frames at a nominal rate. The interval between Beacon frames is defined by the dot11BeaconPeriod parameter of the STA. A STA sending a Beacon frame shall set the value of the Beacon frame's timestamp so that it equals the value of the STA's TSF timer at the time that the data symbol containing the first bit of the timestamp is transmitted to the PHY plus the transmitting STA's delays through its local PHY from the MAC-PHY interface to its interface with the WM [e.g., antenna, light-emitting diode (LED) emission surface].

50. On information and belief, these Accused Instrumentalities are used, marketed, provided to, and/or used by or for each of Defendant's partners, clients, customers and end users across the country and in this District.

51. Defendant was made aware of the '115 patent and its infringement thereof at least as early as April 14, 2016, when Chuck Hausmann, Esq., on behalf of Plaintiffs, sent a letter to Mr. David Zaplosky, General Counsel for Defendant, disclosing the '115 patent and other of

Plaintiffs' patents and alleging that Defendant's products infringed the '115 patent, among others.

52. Upon information and belief, since at least the time Defendant received notice, Defendant has induced and continues to induce others to infringe at least one claim of the '115 patent under 35 U.S.C. § 271(b) by, among other things, and with specific intent or willful blindness, actively aiding and abetting others to infringe, including but not limited to Defendant's partners, clients, customers, and end users, whose use of the Accused Instrumentalities constitutes direct infringement of at least one claim of the '115 patent.

53. In particular, Defendant's actions that aid and abet others such as its partners, customers, clients, and end users to infringe include advertising and distributing the Accused Instrumentalities and providing instruction materials, training, and services regarding the Accused Instrumentalities. On information and belief, Defendant has engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement because Defendant has had actual knowledge of the '115 patent and knowledge that its acts were inducing infringement of the '115 patent since at least the date April 14, 2016 received notice that such activities infringed the '115 patent.

54. Upon information and belief, Defendant is liable as a contributory infringer of the '115 patent under 35 U.S.C. § 271(c) by offering to sell, selling and importing into the United States computerized trading platforms to be especially made or adapted for use in an infringement of the '115 patent. The Accused Instrumentalities are a material component for use in practicing the '115 patent and are specifically made and are not a staple article of commerce suitable for substantial non-infringing use.

55. Since April 14, 2016, Defendant's infringement has been willful.

56. Plaintiffs have been harmed by Defendant's infringing activities.

COUNT III – INFRINGEMENT OF U.S. PATENT NO. 8,934,851

57. The allegations set forth in the foregoing paragraphs 1 through 56 are incorporated into this Third Claim for Relief.

58. On January 13, 2015, U.S. Patent No. 8,934,851 ("the '851 patent"), entitled "Radio Apparatus, and Method and Program for Controlling Spatial Path," was duly and legally issued by the United States Patent and Trademark Office. A true and correct copy of the '851 patent is attached as Exhibit 3.

59. Plaintiff Hera Wireless is the assignee and owner of the right, title and interest in and to the '851 patent. Plaintiffs have the right to assert all causes of action arising under said patents and the right to any remedies for infringement of them.

60. Upon information and belief, Defendant has and continues to directly infringe at least claims 1, 4, and 7 of the '851 patent by making, using, selling, importing and/or providing and causing to be used the Accused Instrumentalities, as defined above.

61. In particular, claim 1 of the '851 patent recites a radio apparatus capable of communicating with another radio apparatus comprising: a radio apparatus capable of communicating with another radio apparatus, comprising: a communication unit configured to communicate using an antenna; and a reception unit configured to receive, from said another radio apparatus, a value indicating possible multiplicity associated with the number of spatial paths that can be formed by said another radio apparatus, at a predetermined timing.

62. On information and belief, the Accused Instrumentalities infringe claim 1 of the '851 patent because they comply with IEEE Standard 802.11n-2009, which requires a radio apparatus capable of communicating with another radio apparatus (the block diagram below

illustrates exemplary elements of the Accused Instrumentalities that function to generate a plurality of spatial paths according to the standard):

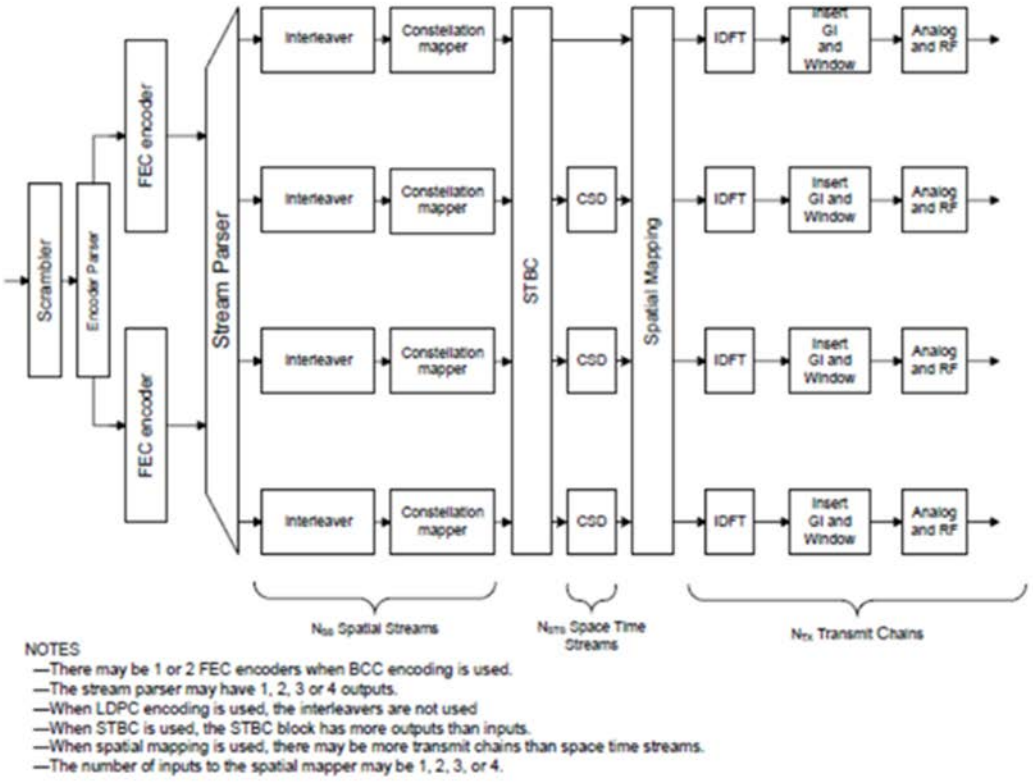


Figure 20-3—Transmitter block diagram 2

comprising: a communication unit configured to communicate using an antenna:

IEEE Std. 802.11n-2009

20.3.9 HT preamble

20.3.9.1 Introduction

The HT preambles are defined in HT-mixed format and in HT-greenfield format to carry the required information to operate in a system with multiple transmit and multiple receive antennas.

See also:

3.249 spatial stream: One of several streams of bits or modulation symbols that may be transmitted over multiple spatial dimensions that are created by the use of multiple antennas at both ends of a communications link.

and a reception unit configured to receive, from said another radio apparatus, a value indicating possible multiplicity associated with the number of spatial paths that can be formed by said another radio apparatus, at a predetermined timing:

IEEE Std. 802.11n-2009

7.3.2.56.4 Supported MCS Set field

The Supported MCS Set field of the HT Capabilities element indicates which MCSs a STA supports.

An MCS is identified by an MCS index, which is represented by an integer in the range 0 to 76. The interpretation of the MCS index (i.e., the mapping from MCS to data rate) is PHY dependent. For the HT PHY, see 20.6.

The structure of the MCS Set field is defined in Figure 7-95o20.

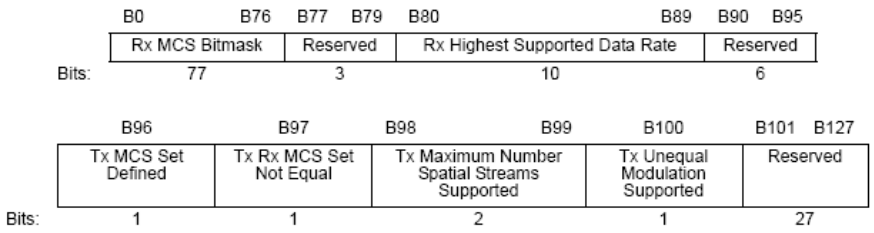


Figure 7-95o20—Supported MCS Set field

Section 20.6 defines the RX MCS Bitmask, and in particular Table 20.29 to Table 20.43 connect each index to a maximum number of spatial streams (Nss). For example:

The rate-dependent parameters for optional 20 MHz, N_{SS} = 3 MCSs with N_{ES} = 1 and EQM of the spatial streams shall be as shown in Table 20-31.

Table 20-31—MCS parameters for optional 20 MHz, N_{SS} = 3, N_{ES} = 1, EQM

MCS Index	Modulation	R	$N_{BPSCS(iSS)}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)	
								800 ns GI	400 ns GI
16	BPSK	1/2	1	52	4	156	78	19.5	21.7
17	QPSK	1/2	2	52	4	312	156	39.0	43.3
18	QPSK	3/4	2	52	4	312	234	58.5	65.0
19	16-QAM	1/2	4	52	4	624	312	78.0	86.7
20	16-QAM	3/4	4	52	4	624	468	117.0	130.0
21	64-QAM	2/3	6	52	4	936	624	156.0	173.3
22	64-QAM	3/4	6	52	4	936	702	175.5	195.0
23	64-QAM	5/6	6	52	4	936	780	195.0	216.7

As shown above, the MCS Set field, including the Rx MCS set, is part of the HT Capabilities element. The HT Capabilities element, including the Rx MCS set, is transmitted from another radio apparatus (and therefore received by the claimed apparatus), as set forth below:

7.3.2.56.1 HT Capabilities element structure

An HT STA declares that it is an HT STA by transmitting the HT Capabilities element. The HT Capabilities element contains a number of fields that are used to advertise optional HT capabilities of an HT STA. The HT Capabilities element is present in Beacon, Association Request, Association Response, Reassociation Request, Reassociation Response, Probe Request, and Probe Response frames. The HT Capabilities element is defined in Figure 7-95o17.

The standard prescribes that the Beacon is transmitted at a predetermined timing, as set forth below:

11.1.1.1 TSF for infrastructure networks

In an infrastructure BSS, the AP shall be the timing master for the TSF. The AP shall initialize its TSF timer independently of any simultaneously started APs in an effort to minimize the synchronization of the TSF timers of multiple APs. The AP shall periodically transmit special frames called *Beacon frames* that contain a copy of its TSF timer to synchronize the TSF timers of other STAs in a BSS. A receiving STA shall always accept the timing information in Beacon frames sent from the AP servicing its BSS. If a STA's TSF timer is different from the timestamp in the received Beacon frame, the receiving STA shall set its local TSF timer to the received timestamp value.

Beacon frames shall be generated for transmission by the AP once every dot11BeaconPeriod TUs.

11.1.2 Maintaining synchronization

Each STA shall maintain a TSF timer with modulus 2^{64} counting in increments of microseconds. STAs expect to receive Beacon frames at a nominal rate. The interval between Beacon frames is defined by the dot11BeaconPeriod parameter of the STA. A STA sending a Beacon frame shall set the value of the Beacon frame's timestamp so that it equals the value of the STA's TSF timer at the time that the data symbol containing the first bit of the timestamp is transmitted to the PHY plus the transmitting STA's delays through its local PHY from the MAC-PHY interface to its interface with the WM [e.g., antenna, light-emitting diode (LED) emission surface].

63. Claim 4 of the '851 patent recites a radio apparatus capable of communicating with another radio apparatus, comprising: a communication unit configured to communicate using a plurality of antennas; a storage unit configured to store beforehand a value indicating possible multiplicity associated with the number of spatial paths formable by said communication unit; and a control unit configured to control a processing of transmitting the value indicating possible multiplicity to the another radio apparatus at a predetermined timing.

64. On information and belief, the Accused Instrumentalities infringe claim 4 of the '851 patent because they comply with IEEE Standard 802.11n-2009, which requires a radio apparatus capable of communicating with another radio apparatus (the block diagram below illustrates exemplary elements of the Accused Instrumentalities that function to generate a plurality of spatial paths according to the standard):

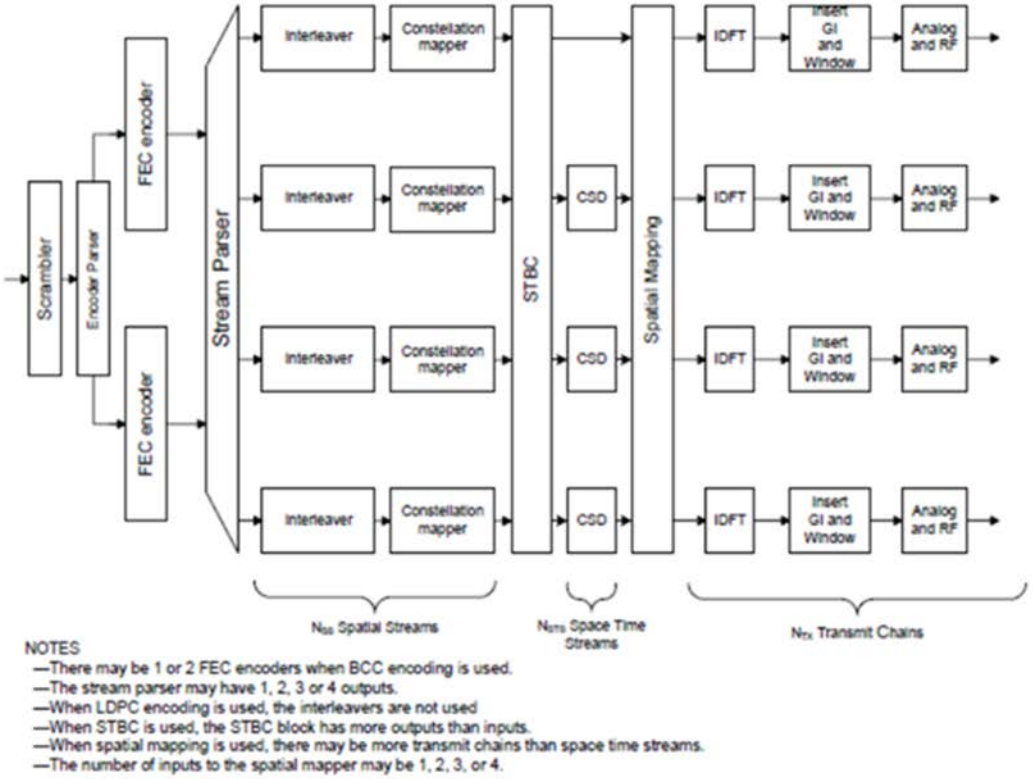


Figure 20-3—Transmitter block diagram 2

comprising: an antenna; a communication unit configured to communicate using a plurality of antennas:

IEEE Std. 802.11n-2009

20.3.9 HT preamble

20.3.9.1 Introduction

The HT preambles are defined in HT-mixed format and in HT-greenfield format to carry the required information to operate in a system with multiple transmit and multiple receive antennas.

See also:

3.249 spatial stream: One of several streams of bits or modulation symbols that may be transmitted over multiple spatial dimensions that are created by the use of multiple antennas at both ends of a communications link.

a storage unit configured to store beforehand a value indicating possible multiplicity associated with the number of spatial paths formable by said communication unit:

IEEE Std. 802.11n-2009

7.3.2.56.4 Supported MCS Set field

The Supported MCS Set field of the HT Capabilities element indicates which MCSs a STA supports.

An MCS is identified by an MCS index, which is represented by an integer in the range 0 to 76. The interpretation of the MCS index (i.e., the mapping from MCS to data rate) is PHY dependent. For the HT PHY, see 20.6.

The structure of the MCS Set field is defined in Figure 7-95o20.

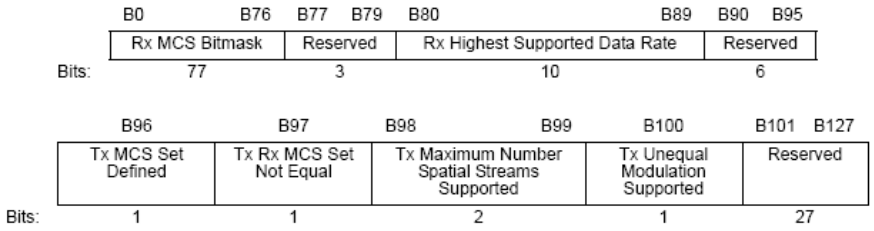


Figure 7-95o20—Supported MCS Set field

Section 20.6 defines the RX MCS Bitmask, and in particular Table 20.29 to Table 20.43 connect each index to a maximum number of spatial streams (Nss). For example:

The rate-dependent parameters for optional 20 MHz, N_{SS} = 3 MCSs with N_{ES} = 1 and EQM of the spatial streams shall be as shown in Table 20-31.

Table 20-31—MCS parameters for optional 20 MHz, N_{SS} = 3, N_{ES} = 1, EQM

MCS Index	Modulation	R	$N_{BPSCS(iSS)}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)	
								800 ns GI	400 ns GI
16	BPSK	1/2	1	52	4	156	78	19.5	21.7
17	QPSK	1/2	2	52	4	312	156	39.0	43.3
18	QPSK	3/4	2	52	4	312	234	58.5	65.0
19	16-QAM	1/2	4	52	4	624	312	78.0	86.7
20	16-QAM	3/4	4	52	4	624	468	117.0	130.0
21	64-QAM	2/3	6	52	4	936	624	156.0	173.3
22	64-QAM	3/4	6	52	4	936	702	175.5	195.0
23	64-QAM	5/6	6	52	4	936	780	195.0	216.7

and a control unit configured to control a processing of transmitting the value indicating possible multiplicity to said another radio apparatus, at a predetermined timing:

As shown above, the MCS Set field, including the Rx MCS set, is part of the HT Capabilities element. The HT Capabilities element, including the Rx MCS set, is transmitted to another radio apparatus, as set forth below:

7.3.2.56.1 HT Capabilities element structure

An HT STA declares that it is an HT STA by transmitting the HT Capabilities element. The HT Capabilities element contains a number of fields that are used to advertise optional HT capabilities of an HT STA. The HT Capabilities element is present in Beacon, Association Request, Association Response, Reassociation Request, Reassociation Response, Probe Request, and Probe Response frames. The HT Capabilities element is defined in Figure 7-95o17.

The standard prescribes that the Beacon is transmitted at a predetermined timing, as set forth below:

11.1.1.1 TSF for infrastructure networks

In an infrastructure BSS, the AP shall be the timing master for the TSF. The AP shall initialize its TSF timer independently of any simultaneously started APs in an effort to minimize the synchronization of the TSF timers of multiple APs. The AP shall periodically transmit special frames called *Beacon frames* that contain a copy of its TSF timer to synchronize the TSF timers of other STAs in a BSS. A receiving STA shall always accept the timing information in Beacon frames sent from the AP servicing its BSS. If a STA's TSF timer is different from the timestamp in the received Beacon frame, the receiving STA shall set its local TSF timer to the received timestamp value.

Beacon frames shall be generated for transmission by the AP once every dot11BeaconPeriod TUs.

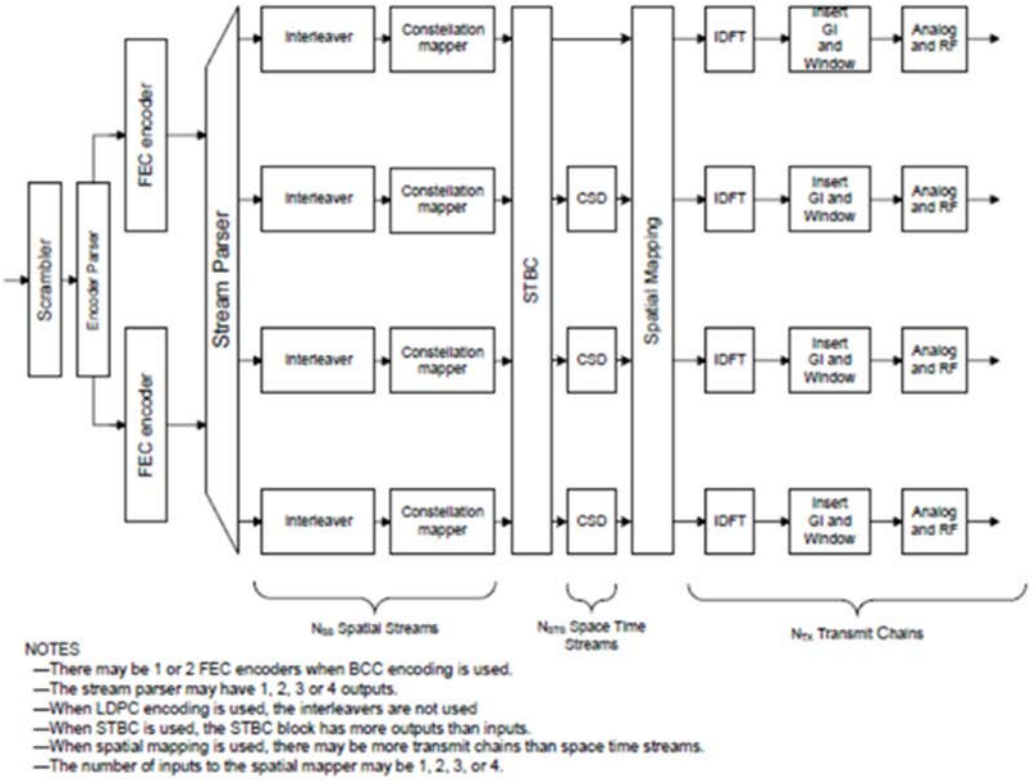
11.1.2 Maintaining synchronization

Each STA shall maintain a TSF timer with modulus 2^{64} counting in increments of microseconds. STAs expect to receive Beacon frames at a nominal rate. The interval between Beacon frames is defined by the dot11BeaconPeriod parameter of the STA. A STA sending a Beacon frame shall set the value of the Beacon frame's timestamp so that it equals the value of the STA's TSF timer at the time that the data symbol containing the first bit of the timestamp is transmitted to the PHY plus the transmitting STA's delays through its local PHY from the MAC-PHY interface to its interface with the WM [e.g., antenna, light-emitting diode (LED) emission surface].

65. Claim 7 of the '851 patent recites a radio apparatus capable of communicating with another radio apparatus, comprising: a communication unit configured to communicate using a plurality of antennas; and a reception unit configured to receive, from said another radio apparatus, a value indicating possible multiplicity associated with the number of spatial paths that can be formed by said another radio apparatus, at a predetermined timing.

66. On information and belief, the Accused Instrumentalities infringe claim 7 of the '851 patent because they comply with IEEE Standard 802.11n-2009, which requires a radio

apparatus capable of communicating with another radio apparatus (the block diagram below illustrates exemplary elements of the Accused Instrumentalities that function to generate a plurality of spatial paths according to the standard):



NOTES
—There may be 1 or 2 FEC encoders when BCC encoding is used.
—The stream parser may have 1, 2, 3 or 4 outputs.
—When LDPC encoding is used, the interleavers are not used
—When STBC is used, the STBC block has more outputs than inputs.
—When spatial mapping is used, there may be more transmit chains than space time streams.
—The number of inputs to the spatial mapper may be 1, 2, 3, or 4.

Figure 20-3—Transmitter block diagram 2

comprising: a communication unit configured to communicate using a plurality of antennas:

> **IEEE Std. 802.11n-2009**
>
> **20.3.9 HT preamble**
>
> **20.3.9.1 Introduction**
>
> The HT preambles are defined in HT-mixed format and in HT-greenfield format to carry the required information to operate in a system with multiple transmit and multiple receive antennas.
>
> *See also*:

3.249 spatial stream: One of several streams of bits or modulation symbols that may be transmitted over multiple spatial dimensions that are created by the use of multiple antennas at both ends of a communications link.

a reception unit configured to receive, from said another radio apparatus, a value indicating possible multiplicity associated with the number of spatial paths that can be formed by said another radio apparatus, at a predetermined timing:

IEEE Std. 802.11n-2009

7.3.2.56.4 Supported MCS Set field

The Supported MCS Set field of the HT Capabilities element indicates which MCSs a STA supports.

An MCS is identified by an MCS index, which is represented by an integer in the range 0 to 76. The interpretation of the MCS index (i.e., the mapping from MCS to data rate) is PHY dependent. For the HT PHY, see 20.6.

The structure of the MCS Set field is defined in Figure 7-95o20.

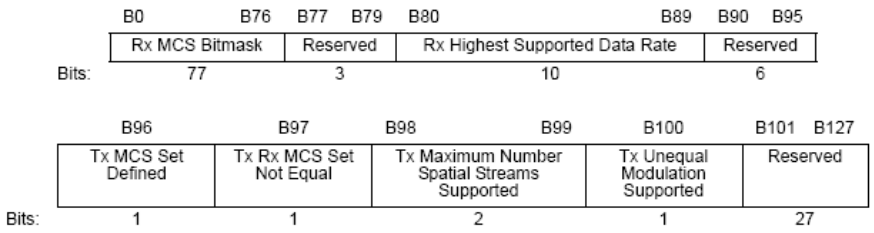


Figure 7-95o20—Supported MCS Set field

Section 20.6 defines the RX MCS Bitmask, and in particular Table 20.29 to Table 20.43 connect each index to a maximum number of spatial streams (Nss). For example:

The rate-dependent parameters for optional 20 MHz, N_{SS} = 3 MCSs with N_{ES} = 1 and EQM of the spatial streams shall be as shown in Table 20-31.

Table 20-31—MCS parameters for optional 20 MHz, N_{SS} = 3, N_{ES} = 1, EQM

MCS Index	Modulation	R	$N_{BPSCS(iSS)}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)	
								800 ns GI	400 ns GI
16	BPSK	1/2	1	52	4	156	78	19.5	21.7
17	QPSK	1/2	2	52	4	312	156	39.0	43.3
18	QPSK	3/4	2	52	4	312	234	58.5	65.0
19	16-QAM	1/2	4	52	4	624	312	78.0	86.7
20	16-QAM	3/4	4	52	4	624	468	117.0	130.0
21	64-QAM	2/3	6	52	4	936	624	156.0	173.3
22	64-QAM	3/4	6	52	4	936	702	175.5	195.0
23	64-QAM	5/6	6	52	4	936	780	195.0	216.7

As shown above, the MCS Set field, including the Rx MCS set, is part of the HT Capabilities element. The HT Capabilities element, including the Rx MCS set, is transmitted from another radio apparatus (and therefore received by the claimed apparatus), as set forth below:

7.3.2.56.1 HT Capabilities element structure

An HT STA declares that it is an HT STA by transmitting the HT Capabilities element. The HT Capabilities element contains a number of fields that are used to advertise optional HT capabilities of an HT STA. The HT Capabilities element is present in Beacon, Association Request, Association Response, Reassociation Request, Reassociation Response, Probe Request, and Probe Response frames. The HT Capabilities element is defined in Figure 7-95o17.

The standard prescribes that the Beacon is transmitted at a predetermined timing, as set forth below:

11.1.1.1 TSF for infrastructure networks

In an infrastructure BSS, the AP shall be the timing master for the TSF. The AP shall initialize its TSF timer independently of any simultaneously started APs in an effort to minimize the synchronization of the TSF timers of multiple APs. The AP shall periodically transmit special frames called *Beacon frames* that contain a copy of its TSF timer to synchronize the TSF timers of other STAs in a BSS. A receiving STA shall always accept the timing information in Beacon frames sent from the AP servicing its BSS. If a STA's TSF timer is different from the timestamp in the received Beacon frame, the receiving STA shall set its local TSF timer to the received timestamp value.

Beacon frames shall be generated for transmission by the AP once every dot11BeaconPeriod TUs.

11.1.2 Maintaining synchronization

Each STA shall maintain a TSF timer with modulus 2^{64} counting in increments of microseconds. STAs expect to receive Beacon frames at a nominal rate. The interval between Beacon frames is defined by the dot11BeaconPeriod parameter of the STA. A STA sending a Beacon frame shall set the value of the Beacon frame's timestamp so that it equals the value of the STA's TSF timer at the time that the data symbol containing the first bit of the timestamp is transmitted to the PHY plus the transmitting STA's delays through its local PHY from the MAC-PHY interface to its interface with the WM [e.g., antenna, light-emitting diode (LED) emission surface].

67. On information and belief, these Accused Instrumentalities are used, marketed, provided to, and/or used by or for each of Defendant's partners, clients, customers and end users across the country and in this District.

68. Defendant was made aware of the '851 patent and its infringement thereof at least as early as April 14, 2016, when Chuck Hausmann, Esq., on behalf of Plaintiffs, sent a letter to Mr. David Zaplosky, General Counsel for Defendant, disclosing the '851 patent and other of Plaintiffs' patents and alleging that Defendant's products infringed the '851 patent, among others.

69. Upon information and belief, since at least the time Defendant received notice, Defendant has induced and continues to induce others to infringe at least one claim of the '851 patent under 35 U.S.C. § 271(b) by, among other things, and with specific intent or willful blindness, actively aiding and abetting others to infringe, including but not limited to Defendant's partners, clients, customers, and end users, whose use of the Accused Instrumentalities constitutes direct infringement of at least one claim of the '851 patent.

70. In particular, Defendant's actions that aid and abet others such as its partners, customers, clients, and end users to infringe include advertising and distributing the Accused Instrumentalities and providing instruction materials, training, and services regarding the Accused Instrumentalities. On information and belief, Defendant has engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement

because Defendant has had actual knowledge of the ’851 patent and knowledge that its acts were inducing infringement of the ’851 patent since at least the date April 14, 2016 received notice that such activities infringed the ’851 patent.

71. Upon information and belief, Defendant is liable as a contributory infringer of the ’851 patent under 35 U.S.C. § 271(c) by offering to sell, selling and importing into the United States computerized trading platforms to be especially made or adapted for use in an infringement of the ’851 patent. The Accused Instrumentalities are a material component for use in practicing the ’851 patent and are specifically made and are not a staple article of commerce suitable for substantial non-infringing use.

72. Since April 14, 2016, Defendant’s infringement has been willful.

73. Plaintiffs have been harmed by Defendant’s infringing activities.

STATEMENT REGARDING RAND OBLIGATION

74. Plaintiffs contend that, pursuant to relevant IEEE bylaws, the ’103, ’115, and ’851 patents are subject to Reasonable and Non-Discriminatory (“RAND”) licensing obligations to willing licensees.

75. As of the time of this complaint, over sixty companies have taken a license to one or more of the ’103, ’115, and ’851 patents.

76. Despite notice of its infringement, Defendant has refused to license the ’103, ’115, and ’851 patents willingly. Accordingly, Defendant should be treated as an unwilling licensee, so that Plaintiffs are not bound by any RAND licensing obligation for purposes of this action or any license to Defendant. Accordingly, Plaintiffs seek the maximum available reasonable royalty damages to compensate for Defendant’s infringing activities.

JURY DEMAND

Pursuant to Rule 38 of the Federal Rules of Civil Procedure, Plaintiffs demand a trial by jury on all issues triable as such.

PRAYER FOR RELIEF

WHEREFORE, Plaintiffs demand judgment for itself and against Defendant as follows:

A. An adjudication that Defendant has infringed the ’103, ’115, and ’851 patents;

B. An award of damages to be paid by Defendant adequate to compensate Plaintiffs for Defendant’s past infringement of the ’103, ’115, and ’851 patents, and any continuing or future infringement through the date such judgment is entered, including interest, costs, expenses and an accounting of all infringing acts including, but not limited to, those acts not presented at trial;

C. A declaration that this case is exceptional under 35 U.S.C. § 285, and an award of Plaintiffs’ reasonable attorneys’ fees; and

D. An award to Plaintiffs of such further relief at law or in equity as the Court deems just and proper.

Dated: July 14, 2017

DEVLIN LAW FIRM LLC

*/s/ Timothy Devlin*_____

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